GENERAL COMMENTS

Servicing the Advent VideoBeam 1000A should not present any great difficulty to any technician who is thoroughly versed in the theory and practices associated with solid state color television receivers. Armed with this knowledge, appropriate test equipment, and this manual, most of the problems that may be encountered can be repaired in the field.

Despite the large projected image, most circuitry is similar in operation to corresponding sections of conventional color receivers. Some circuitry has been refined beyond the conventional format due to the more stringent requirements of projection television; other circuitry is unique.

In the circuit description section of this manual, the degree of detail in description used in each section generally reflects the variation from conventional practice. Commonly used circuits are briefly described; unique areas are explored more thoroughly.

In this sense, this manual is to be viewed as a supplement tó the expertise of knowledgeable color television repair technicians; it does not attempt to be a complete treatise on the subject.

"The problem that wasn't there..."

As in servicing conventional color television receivers, the technician should first *be certain that a legitimate problem does exist.*

Because of the different display format and some new and different controls to be adjusted by the owner there are more potential situations in which the owner may feel that there is a problem where none exists. A list of possible problems would start with the classic case of the line cord that wasn't plugged in ... or was plugged into a dead wall socket!

The Owner's Manual includes a list of possible problems caused by mis-thrown switches, etc., These should all be checked, if appropriate to the specific case.

Beyond these cases lie the less obvious problems caused by unsatisfactory antenna systems; excessively low (or high) line voltage; improper screen and/or projector placement; improper room lighting; local sources of interference; customer misadjustment of external (or internal) controls intended for factory or service technician use only.

Another category of complaint which may be faced could be classed as a misunderstanding on the part of the owner as to what the VideoBeam 1000A is ... and what it *is not.* That it cannot present a life-size image to a group of hundreds of people in a large auditorium; that it cannot work well with direct sunlight hitting the screen; that it cannot turn poor quality video material into good; and that fingerprints and the screen's surface are an unhappy combination!

The problems mentioned above (and many others) can be solved, or at least reduced, by the appropriate antenna repair or replacement, readjustment of controls or *OWNER EDUCATION.*

Advent Corporation has tried to warn potential owners that the VideoBeam 1000A may prove unsatisfactory under certain conditions of lighting, reception, etc. Nevertheless, this type of situation may be found when a service visit is made.

"The problem that *is* there ..."

If a real problem does seem to exist, the first step is to try to locate as closely as possible the source of the difficulty. Analysis of the symptoms and intelligent experimentation with user controls are the key aides here; the block diagram and circuit description are valuable tools.

The fact that a problem exists in only one of the 3 projection tubes narrows the possible causes greatly; satisfactory sound from external sources but not from off-the-air stations points in a particular direction; reading the *entire* circuit description may yield useful clues as there are many cross-connections between different circuits for synchronization, blanking, etc.

Suggested Test Equipment

No service should be attempted without a good DC-coupled triggered-sweep oscilloscope of at least 10 mv. sensitivity and low-capacitance 10 megΩ probes. Dual-trace (or dual-beam) operation is a frequent necessity for the observation of the time relationship between signals being observed. A single-trace scope is useful for general troubleshooting; use of a non-triggered sweep scope is discouraged if it can at all be avoided. The preferred bandwidth of the oscilloscope is 10 MHz, but 5 MHz can be used.

A trustworthy VOM (20 KΩ/V) is necessary. A source of stable NTSC-format video can be useful, especially if the problem requires an unchanging signal to facilitate troubleshooting or alignment. For realignment (or alignment verification) of the NTSC decoder board, an NTSC color bar generator is necessary.

PRECAUTIONS FOR PERSONAL SAFETY

Because of the "instant-on" feature in the VideoBeam 1000A and the provision to keep the fan running after the receiver is turned off, *primary power appears at several points within the chassis when the volume control/power switch is off.* For maximum safety to circuitry and personnel, always disconnect the receiver from the power socket when working on it except while actually troubleshooting.

The anode voltage in the VideoBeam 1000A is 30 KVDC. All wiring carrying anode voltage, the cathode ray tubes, and the horizontal output assembly (including G2 Doubler and Regulator) should be treated with the utmost respect and care. The inherent danger of high voltage (and glass under high vacuum) should not be ignored. Never scratch the CRTs' glass envelopes nor bump or jar them. *Never* carry more than one CRT at a time. *Always* discharge the anode lead to the tube's metal frame before handling the tube – they can store charge for long periods of time and can "recharge" after being discharged.

When removal of a CRT is necessary, grasp it either by 2 of the 4 arms of the metal frame or by one arm and the corrector lens assembly. The tube should be stored vertically, with a protective cushion under the corrector lens to prevent scratching. The neck of the tube is especially vulnerable to damage during handling and installation; do not bump it or strike it.

WARNING

SAFETY GLASSES SHOULD BE WORN WHENEVER WORKING WITH OR NEAR A CRT.

Never operate the receiver with any wires in the horizontal output assembly disconnected unless specifically suggested. With certain feedback connections disconnected, the anode voltage can rise above 40 KVDC.

Always be aware that the fan is in operation when the power switch is on and can nick fingers and throw small pieces of hardware. After sufficient warm-up, it is on even when the power switch is off.

As in most television receivers, the CRT filaments carry a DC bias of about 150 VDC to reduce the likelihood of cathode-heater shorts.

Anode Voltage and X-Radiation

The servicing technician must not under any operating circumstances adjust the anode voltage above its normal 30 KV setting. Adjustment beyond 30 KV will result in picture defocusing, raster shrinkage, tripping of safety circuits and unnecessary strain on the entire horizontal output assembly.

Should the anode voltage change for any reason, it will probably be impossible to "go through focus" on one or more of the cathode ray tubes during focusing and convergence. Adjust the kick-panel mounted "H–V" control so that all three tubes can be adjusted from one side of optimum focus to the other by the appropriate front panel focus control. If such a setting cannot be found, there is probably a malfunction in the horizontal output section.

Despite the large size of the image, there are no special warnings or precautions regarding x-radiation emission *beyond that which is customary in a conventional solid-state color television receiver.*

There is no shunt-regulator tube or high voltage rectifier tube to generate x-rays; the anode voltage is no higher than is being used in several direct-view color television receivers and is at a beam current significantly lower.

The very thick strontium-bearing glass face plate is an excellent x-ray barrier; the rest of the envelope is of thinner (but also x-radiation shielding) glass.

Should the anode voltage rise appreciably above 30 KV (to about 32 KV) a sensing circuit automatically disables the horizontal drive, and so turns off the anode supply. (The circuit breaker may also trip.)

Anode Power Wiring

The wire and connectors used in the anode circuitry of the Advent VideoBeam 1000A will operate properly *only* if installed correctly. When CRTs are replaced, the anode leads must be positioned as shown in the photographs. Improper lead dress may result in eventual arcing, breakdown, and damage to the receiver (although initial operation may be satisfactory).

CRT-related Problems

Because of the extreme image magnification, the quality of focus of the electron beam in the CRT is extremely important. Defocusing of the beam by even a slight amount can result in an unacceptable projected image.

Most of the energy required to focus the electron beam is supplied by a permanent magnet on the neck of the tube. The additional energy required comes from a coil wound inside this magnet, which is supplied a well-regulated (and owner-adjustable) current by the focus regulator board (2300).

The quality of focus and the position of the raster on the phosphor-coated anode target are strongly affected by the position of the focus magnet and coil assembly. Special jigs and test fixtures are required to adjust the assembly. There is no practical way to remove and properly replace the focus magnet and yokes in the field. Because of this, each CRT *and its associated accessories* (deflection/convergence yoke and focus magnet assembly) must be treated as an integral unit. Except for slight rotation of the yoke during convergence procedures, no removal or adjustment of these devices should be attempted.

NOTE

SHOULD A DEFECT BE FOUND IN A CRT, DEFLECTION YOKE, CONVERGENCE YOKE, OR FOCUS MAGNET ASSEMBLY, THE *ENTIRE* CRT MUST BE REPLACED. CONTACT ADVENT CORPORATION FOR INSTRUCTIONS FOR ORDERING REPLACEMENT CRT'S AND RETURNING DEFECTIVE UNITS.

THE PROJECTION TUBE

An Advent "LightGuide" (TM) projection tube is a monochromatic cathode ray tube (CRT) which projects the image it generates rather than displaying it in the traditional fashion on the CRT face. The image is formed on a phosphor-coated target within the CRT, and is then projected to the viewing screen via an optical system consisting of a mirror mounted within the CRT and a corrector lens mounted externally.

Two distinct focusing mechanisms are required here: the electron beam must be magnetically focused within the CRT to form a sharp image on the target, and the image must then be transferred in optical focus to the viewing screen. The first is accomplished by a permanent magnet-electromagnet combination mounted on the neck of the tube, and the second by properly aligning the projector to the screen so that optical focal lengths are preserved.

Requirements of a Tube for Projection:

Gun Assembly:	Filament:	6.3 volts AC, (between pins 1 and 14 of the tube base), 150 volts DC above ground
	Cathode:	Video information: Black level = 150V Peak White= 110V
	G1:	60 to 80 volts DC
	G2:	400 to 800 volts DC
	Anode or G3:	30,000 volts DC
Yoke Assembly:	Horizontal deflection coils:	2.5A p-p hor. rate sawtooth
	Vertical deflection coils:	0.8A p-p vert. rate sawtooth
	DC positioning (for static convergence):	-30 ma to +30 ma DC current
	Dynamic convergence coils:	Composite current waveform of correction required for dynamic convergence of images at the screen.
	Focus Magnet Assembly:	Internally-wound electromagnet 0 to 200 mA DC current (to provide a focusing adjustment)
	Screen-Projector Distance:	100" (+ or - 1") from center of corrector lens to center of screen.

ADVENT SAFETY FEATURES

The VideoBeam 1000A is equipped with a variety of circuits which constantly monitor vital receiver functions. In the event of a malfunction, these circuits will shut down the appropriate circuitry to prevent damage to the set. In addition, other features are designed to prevent damage in case of tube arcs, short circuits and the absence of necessary boards and yokes. These safety features are as follows:

(1) Scan Failure Protection - The phosphor targets are protected from damage from electron beam energy concentration (due to a scanning failure) by the scan failure protection board (2700). If either the horizontal or vertical sweep circuits fail, the tubes will be turned off electronically by a severe reverse bias of G1. The scan failure protection circuits also act to prevent a bright flash at turn off.

(2) Anode Over-Voltage Protection - Excessive anode voltage and associated possible X-radiation are protected against by the anode over-voltage protection circuit. This circuit will shut down the horizontal oscillator board (1700) and thus disable the horizontal output and high voltage generation circuits if the anode voltage increases by 7% (to about 32 KV) over its nominal setting. This protection circuit will reset itself roughly one minute after primary power is turned off, so if the circuitry has tripped due to some random transient, turning off the set to allow this resetting action will restore normal operation.

(3) Overheating Protection - The set is protected against overheating (due to a failure of the cooling fan or a clogged air filter) by a thermostat mounted beneath the control panel; this thermostat will shut off line power to the power supply in the case of a significant rise in temperature within the set. In addition, if the set has been on sufficiently long (about an hour) a thermostat mounted on the power transformer may hold the cooling fan on *after the set has been turned off* until the set is sufficiently cool. (This may not happen if the room's temperature is sufficiently low.)

(4) Power Supply Protection - The power supply is protected from drawing excessive line current by a circuit breaker (located on the kick panel). The +15 and +30 volt regulators are equipped with current fold-back features as well as fuses to prevent damage in case of a short circuit or excessive current drain. The +40 volt supply is protected against a vertical output device short by fuses in the vertical output circuitry. The filament transformer is protected by a fuse in the primary.

(5) Arc Protection - The electronics for generating the G1, G2, and Cathode signals are protected against high voltage arcing to those grid elements by an assortment of arc gaps, series resistors and clamping diodes. The focus regulator board is protected by neon bulbs. Damage to the grid elements themselves is minimized by resistors in the anode leads which limit the energy available in case of an arc.

(6) Vertical Output Protection - The vertical output circuitry is prevented from operation under "no load" conditions by interlocks on each yoke connector and on the pincushion board.

(7) Anode Current Protection - The anode voltage generation circuitry and the projection tubes are protected from drawing excessive current (beam current in the tubes) by the brightness limiter; this circuit will electronically turn down the brightness level to limit the total tube beam current to 600 μA, and beam current for any one tube to 200 μA (total beam current for a *typical* picture is 200-300 μA).

(8) Protection against accidental high voltage generation - To protect the set, the tubes and *the serviceman* from inadvertant high voltage generation, interlocks in the 160 volt line to the high voltage cage are present in the yoke connectors, on the pincushion board (2100) and on the horizontal output board (1800).

A good understanding of the above "VideoBeam" (TM) features is essential to efficient servicing. Failure to realize that some protection device has been activated can lead to a great deal of wasted trouble-shooting time, whereas the knowledge that a particular circuit has tripped can lead directly to the mal-function in the set.

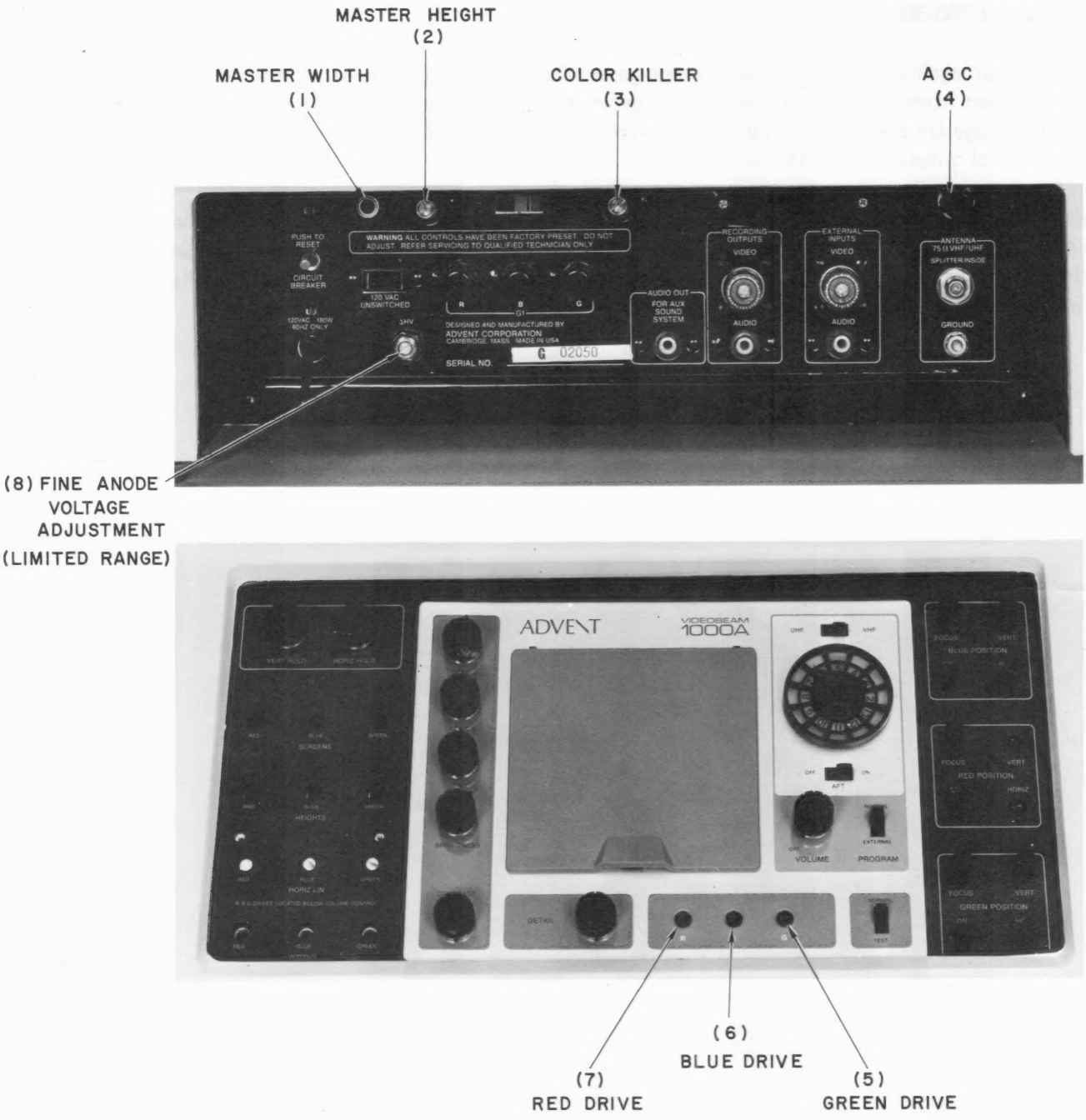

Figure 3-1. KICK PANEL AND CONTROL PANEL

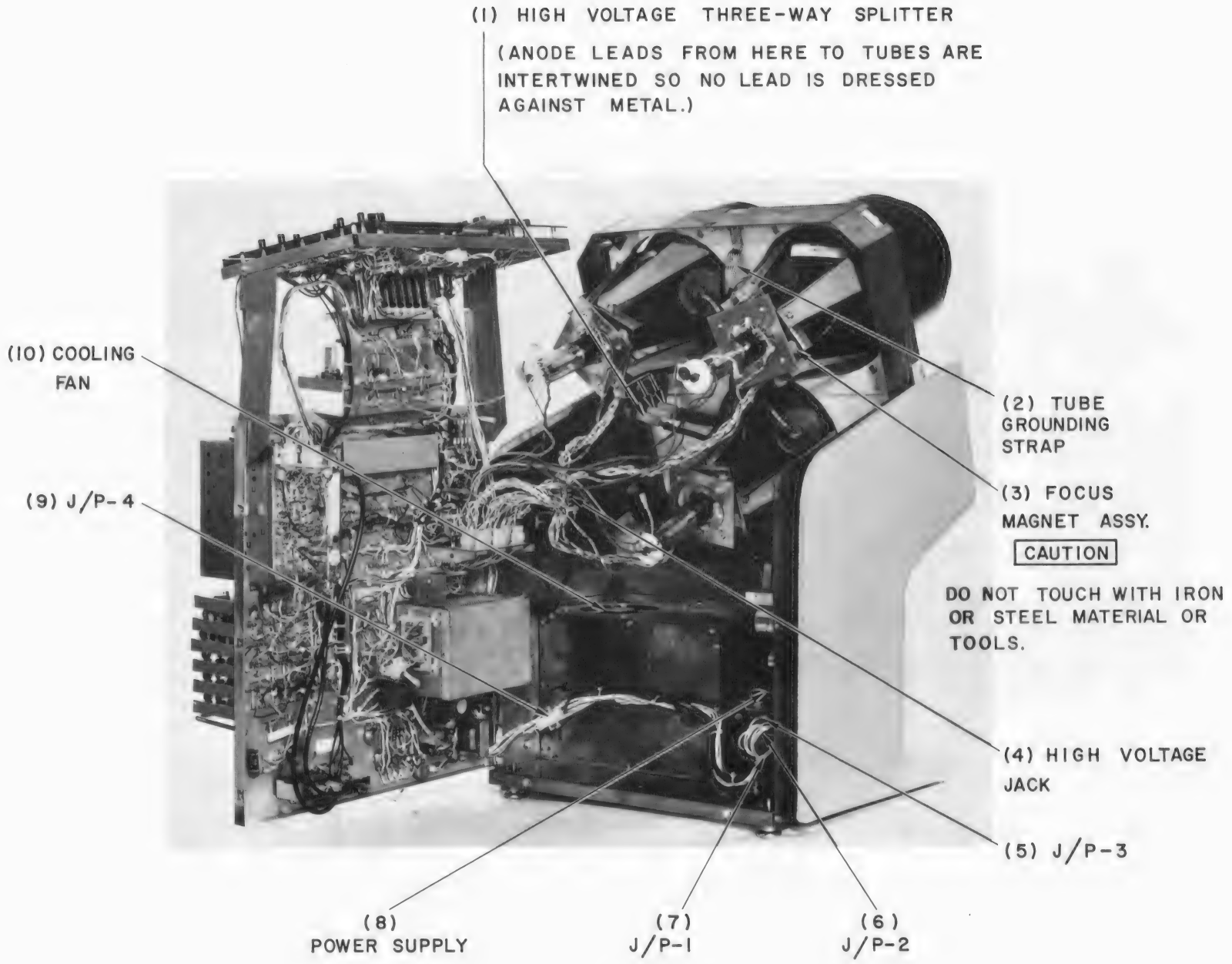

Figure 3-2. INSIDE OF DOOR AND MAIN FRAME

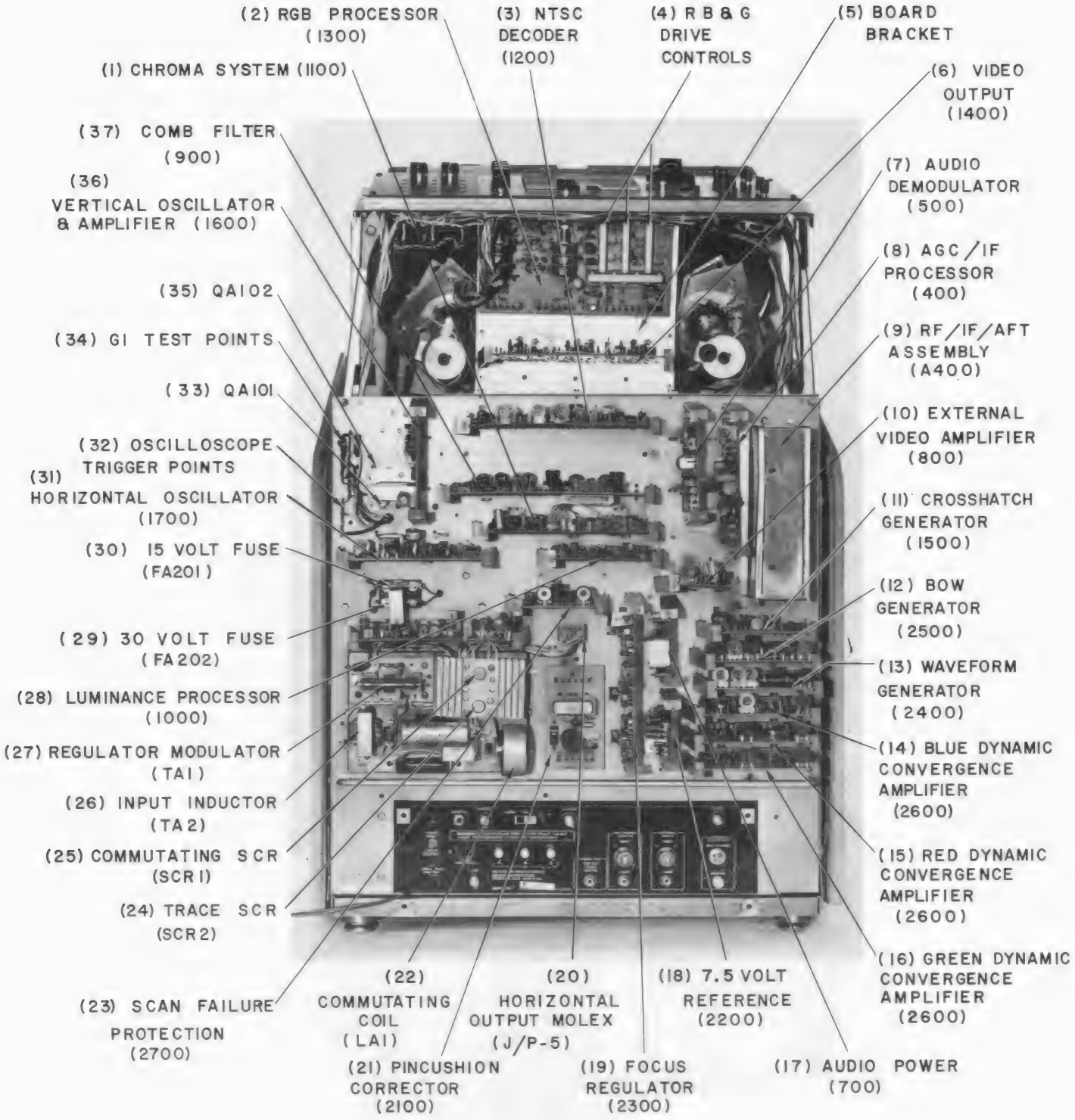

Figure 3-3. OUTSIDE OF MAIN CHASSIS DOOR

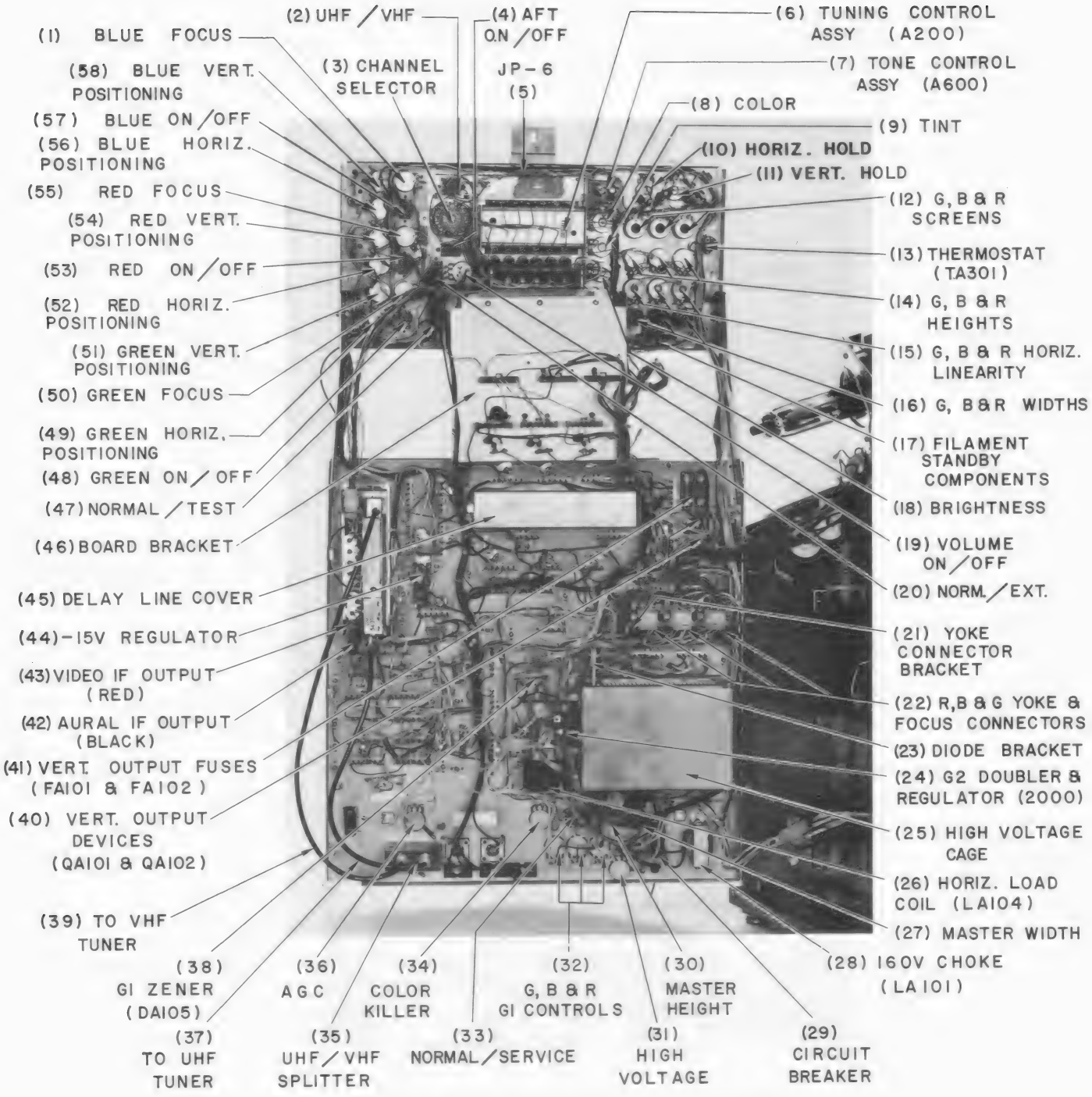

Figure 3-4. INSIDE OF MAIN CHASSIS DOOR AND SUBPANEL

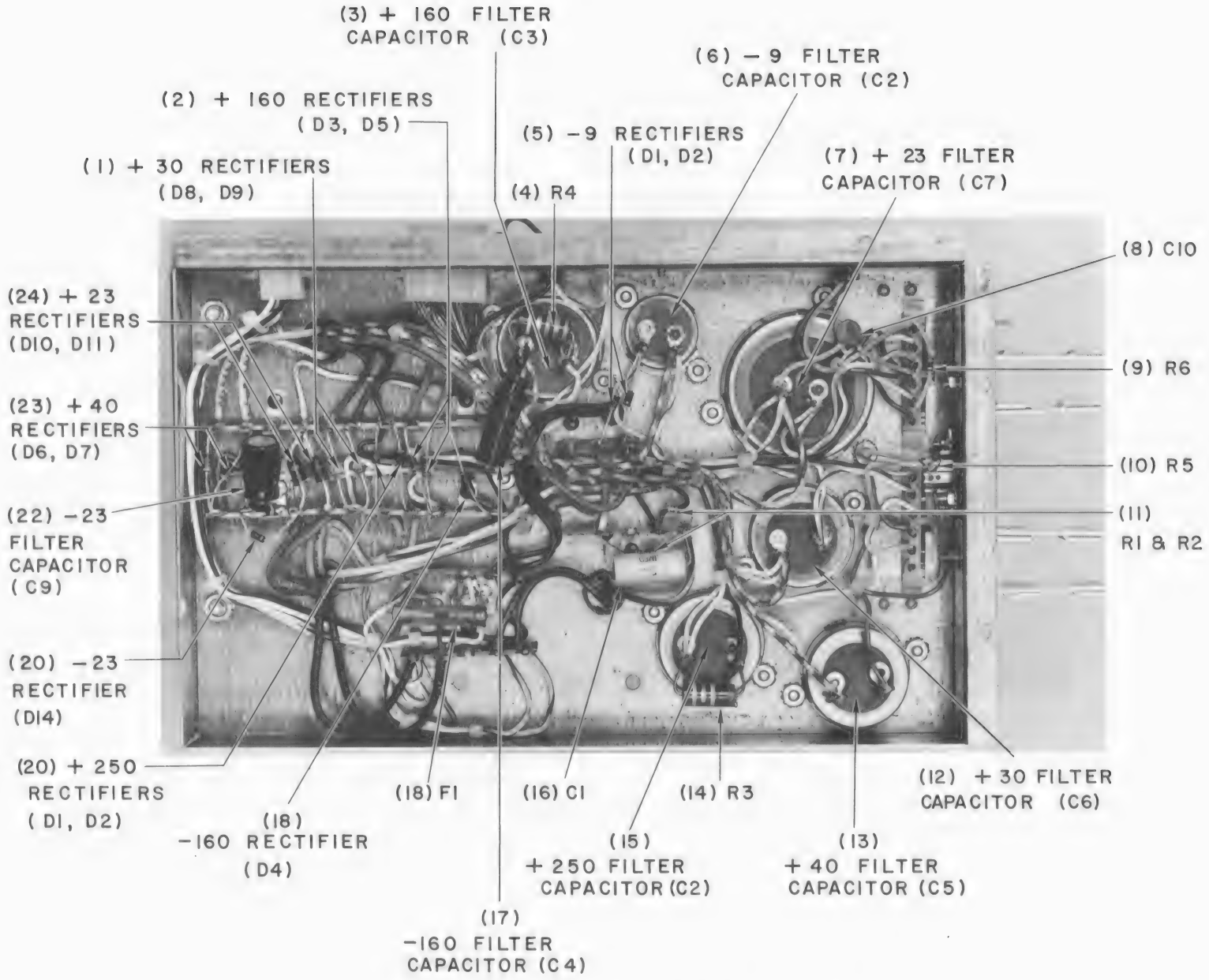

Figure 3-5. UNDERSIDE OF POWER SUPPLY ASSEMBLY

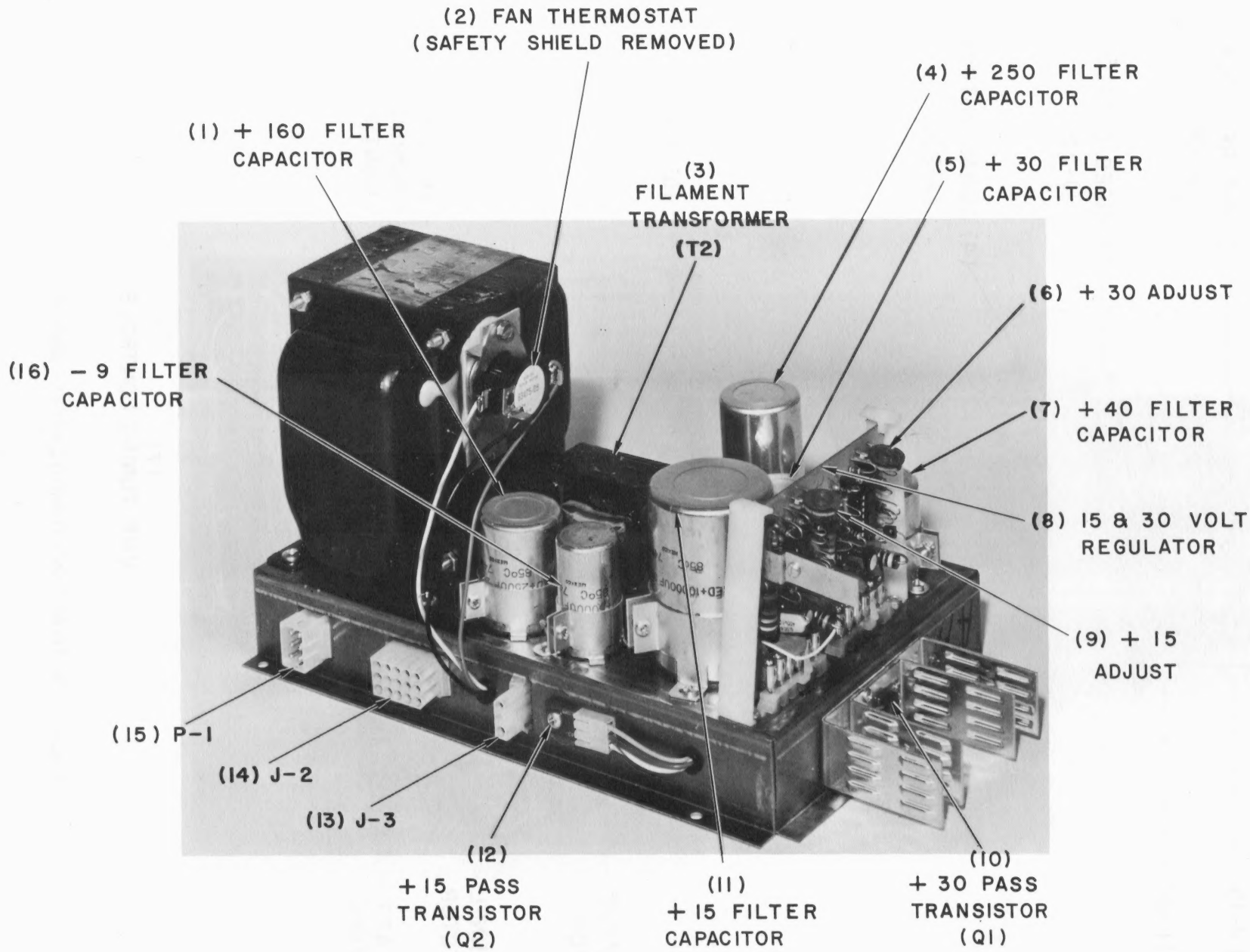

Figure 3-6. POWER SUPPLY ASSEMBLY

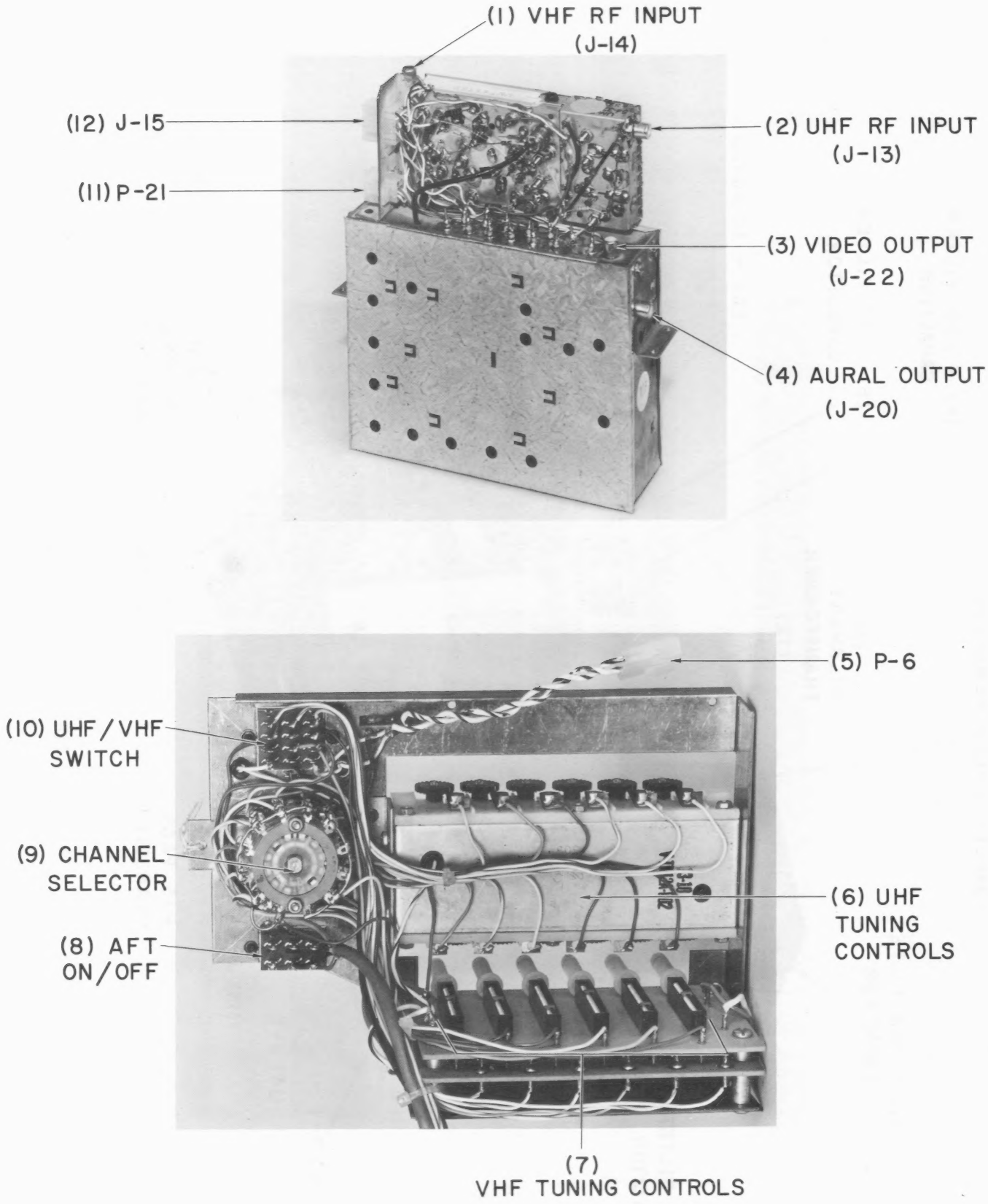

Figure 3-7. RF/IF/AFT AND TUNING BRACKET ASSEMBLIES

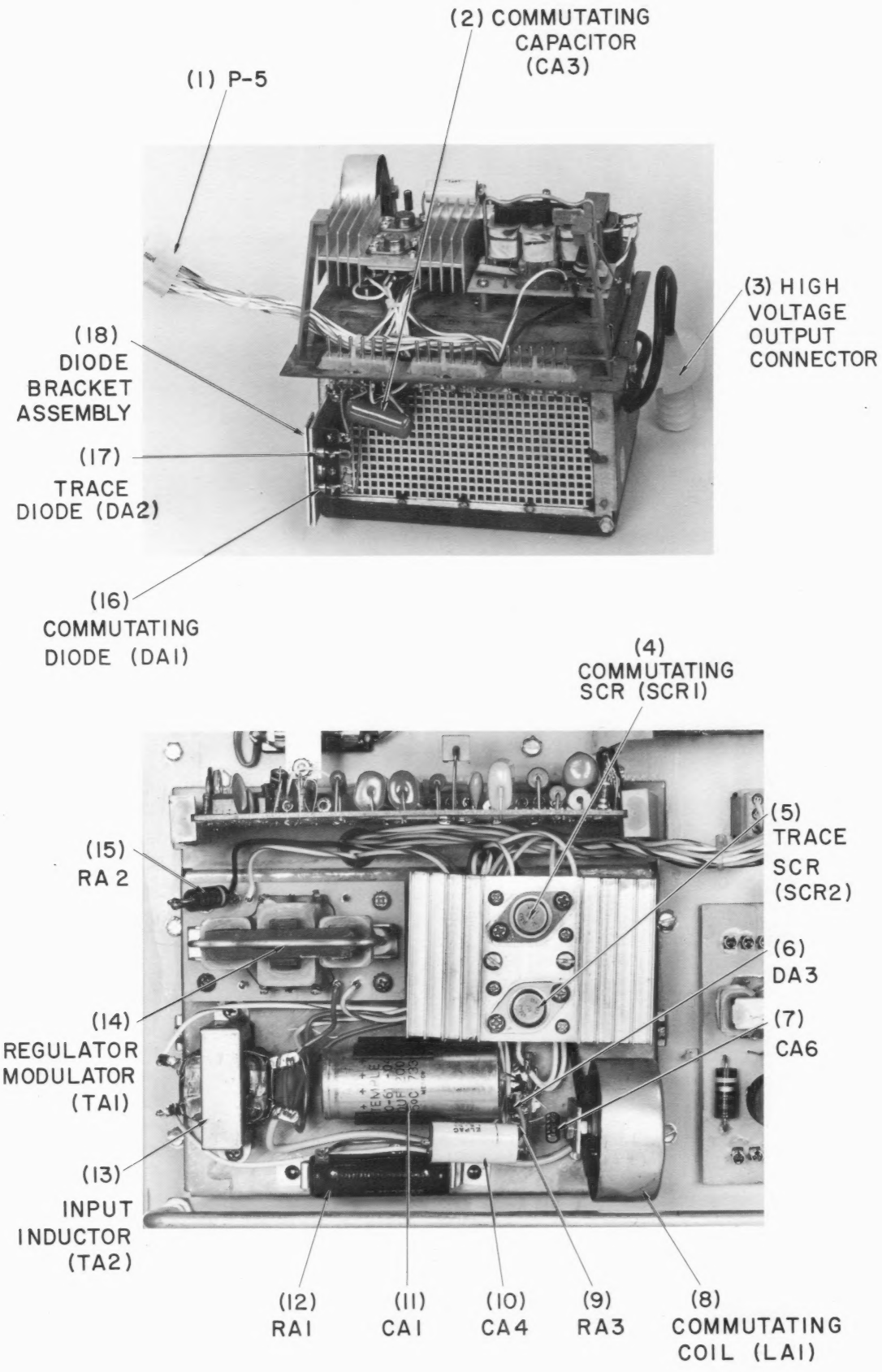

Figure 3-8. HIGH VOLTAGE CAGE AND COVER ASSEMBLY